

Appl. No. : 10/807,528
Filed : March 23, 2004

REMARKS

No amendment has been made in this response. Applicant respectfully requests reconsideration of the application in view of the following remarks.

Response to Arguments

The Office action states: "Applicant's argument that ladder type electrode 32 is Murata et al is an inductive electrode and is not capacitively coupled with heater 34, and is thus different from parallel plate (capacitively coupled) electrodes as per claim 1 limitation has been considered and found persuasive and the rejection is withdrawn. However on further consideration new ground of rejection is made in view of new references (US Patent no. 7,153,387 - Tomoyasu, and US patent No. 5,935,374 - Ito et al) that when combined with Murata et al read on claim 1 limitations."

However, the electrodes shown in Tomoyasu and Ito are capacitively coupled electrodes, not an inductance electrode, and there is **no evidence** that capacitively coupled electrodes were replaceable with an inductance electrode (the ladder-type electrode of Murata). On the contrary, Murata well recognizes the differences between the ladder-type electrode (an inductance electrode) and the parallel-plate type electrodes (capacitively coupled electrodes) and describes the problems separately. See, e.g., col. 1, lines 15-20, and col. 2 and col. 3. Murata then provides a solution only with regard to the ladder-type electrode, and Murata in no way teaches that his solution can apply to the parallel-plate type electrodes. Since the ladder-type electrode and the parallel-plate type electrodes work differently, combining the prior art elements is not sufficient to render the claimed invention obvious. Further, as explained below, there is no evidence that multiply branching branches connected to parallel-plate type electrodes and their functions were known.

Rejection of Claims 1-6, 9, 14-17, 28-30 Under 35 U.S.C. § 103

Claims 1-6, 9, 14-17, 28-30 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tomoyasu in view of Murata and Ito.

Claim 1 recites, among others:

said radio-frequency transmission unit comprising:
an inlet transmission path and multiple branches branched off from the inlet transmission path, wherein each branch connected to the supply point of the parallel-

electrode is multiple branchings downstream of the inlet transmission path and has a substantially equal characteristic impedance value; and

at least one inductance adjuster which is removably installed in at least one branch to render substantially equal the characteristic impedance value of each branch connected to the multiple supply points.

Due to the above configurations, in an apparatus using parallel-plate type electrodes, even if there are stray capacitance arising between the radio-frequency channels and their peripheral parts and/or individual characteristic-impedance differences caused by characteristic errors of the coaxial cables, film thickness non-uniformity within $\pm 3\%$, which is required for recent LSI devices, can be achieved. *Specification* at page 2, paragraph [0007], page 24, paragraph [0087].

The Office action points out that Tomoyasu teaches "a feeder rod 68 (inlet transmission path) and feeder member 69 (like multiple branches) branched off from the inlet transmission path (column 12, lines 1-67)."

However, Tomoyasu states:

Thus, the switching elements 71 which are turned on by the controller 72 are **sequentially switched**. In response thereto, each of the receiving terminal portions 60' sequentially receives a high frequency electric power from the high frequency electric power supply 40. Therefore, the feeding position to the top electrode 21 moves in accordance with the **on-off control action** of the switching element 71 in response to the signal from the controller 72, so that no interference occurs unlike a case where a high frequency electric power is fed from the center of the top electrode 21. Thus, it is possible to prevent standing waves caused by the interference action from being formed. Specifically, the feeding position to the top electrode 21 is set to be the receiving terminal portions 60', which is shifted from the center of the top electrode 21, so that the position having the high field intensity is shifted from the center of the top electrode 21, and a receiving one of the receiving terminal portions 60' arranged on the circumferences concentrically with the top electrode 21 is **sequentially switched to rotate the feeding position** to the top electrode 21 to **move the position** having the high field intensity, so that the field intensity is equalized. Therefore, the field distribution on the plasma contact surface of the top electrode 21 can be uniform, so that the density of plasma can be uniform. *Tomoyasu* at col. 12, lines 43-67, emphasis added.

Tomoyasu specifically teaches that by **switching or rotating** the feeding position, the field intensity is equalized. Tomoyasu provides **no** indication that high frequency power is supplied at multiple positions at the same time or simultaneously. In other words, Tomoyasu specifically teaches supplying high frequency power to a **single** position at a time via each feeder member 69, and Tomoyasu provides **no** indication or suggestion of each feeder member 69 being multiple branchings.

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In Tomoyasu, each feeder member 69 is connected to a single receiving terminal portion 60'. There is no evidence that supplying high frequency power from one feeder member to multiple points of parallel-plate type electrodes was known.

Murata teaches a ladder-type electrode having multiple supply points arranged at two opposing sides of the ladder-type electrode, i.e., an inductance electrode. An inductance electrode and capacitively coupled plate electrodes are technologically and structurally different and non-replaceable at least with regard to the RF power supply manner. As discussed earlier, Murata itself distinguishes the ladder-type electrode from parallel-plate type electrodes and applies the multiple supply point arrangement solely to the ladder-type electrode. There is no evidence that an inductance electrode and capacitively coupled plate electrodes were replaceable with regard to the RF power supply manner.

Further, neither Tomoyasu nor Murata recognizes stray capacitance arising between the radio-frequency channels and their peripheral parts and/or individual characteristic-impedance differences caused by characteristic errors of the coaxial cables. Due to the configurations in the parallel-plate type electrodes recited in claim 1, even if there is stray capacitance and/or individual characteristic-impedance differences, film thickness non-uniformity within $\pm 3\%$, which is required for recent LSI devices, can be achieved. The results would not have been predictable from Tomoyasu and Murata.

At least in view of the above, claim 1 cannot be obvious over Tomoyasu and Murata.

Further, with regard to "at least one inductance adjuster" in claim 1, the Office action states that Ito teaches a plurality of coils (three, as shown in Figure 7). However, Ito does not teach multiply-branching branches and therefore the coils cannot be used "to render substantially equal the characteristic impedance value of each branch connected to the multiple supply points" as recited in claim 1. No prior art teaches a combination of multiply-branching branches and at least inductance adjuster installed at least in one branch.

At least in view of the foregoing, claim 1 cannot be obvious over Tomoyasu, Murata, and Ito.

Claims 15 and 16 recites limitations similar to those recited in claim 1 discussed above. Thus, claims 1, 15, and 16, and dependent claims cannot be obvious over the references. The reasons for rejection which are not discussed above are moot. Applicant respectfully requests withdrawal of this rejection.

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Rejection of Claim 7 Under 35 U.S.C. § 103

Claim 7 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tomoyasu in view of Murata and Ito and further in view of Blonigan. However, like Tomoyasu, Murata, and Ito, Blonigan does not teach the above discussed features of the invention recited in claim 1. Claim 7 depends from claim 1, and at least for this reason, claim 7 cannot be obvious over the above references. Applicant respectfully requests withdrawal of this rejection.

Rejection of Claim 8 Under 35 U.S.C. § 103

Claim 8 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tomoyasu in view of Murata and Ito and further in view of McGaffigan. However, like Tomoyasu, Murata, and Ito, McGaffigan does not teach the above discussed features of the invention recited in claim 1. Claim 8 depends ultimately from claim 1, and at least for this reason, claim 8 cannot be obvious over the above references. Applicant respectfully requests withdrawal of this rejection.

Rejection of Claim 11 Under 35 U.S.C. § 103

Claim 11 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tomoyasu in view of Murata, Ito, and Blonigan and further in view of McGaffigan. However, as discussed above, none of the references teaches the above discussed features of the invention recited in claim 1. Claim 11 depends ultimately from claim 1, and at least for this reason, claim 11 cannot be obvious over the above references. Applicant respectfully requests withdrawal of this rejection.

Rejection of Claims 12, 13 Under 35 U.S.C. § 103

Claims 12 and 13 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tomoyasu in view of Murata and Ito and further in view of DeOrnellas. However, like Tomoyasu, Murata, and Ito, DeOrnellas does not teach the above discussed features of the invention recited in claim 1. Claims 12 and 13 depends ultimately from claim 1, and at least for this reason, claims 12 and 13 cannot be obvious over the above references. Applicant respectfully requests withdrawal of this rejection.

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CONCLUSION

In light of the Applicant's amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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